[0055] FIG. **13** is a cross-sectional view showing a structure of a semiconductor image sensing element according to a variation of the third embodiment;

[0056] FIG. **14** is a cross-sectional view showing a structure of a semiconductor image sensing device using the semiconductor image sensing element of FIG. **13**;

[0057] FIGS. **15**A to **15**C are cross-sectional views illustrating the process steps of fabricating the semiconductor image sensing device using the semiconductor image sensing element according to the third embodiment; and

[0058] FIG. **16**A is a graph showing the degradation of sensitivity resulting from the size reduction of a typical CCD cell and FIG. **16**B is a table showing for comparison the effects of a hollow package having a conventional structure and a semiconductor image sensing device according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0059] Referring to the drawings, the embodiments of the present invention will be described herein below in detail. For drawing convenience, components in the drawings are different in thickness, length, configuration, and the like from the actual components. The number of electrodes on a semiconductor image sensing element is also different from that in an actual situation. The number of the electrodes in the drawings is such that it allows easy depiction of the electrodes. There are cases where the description of the same components is omitted by retaining the same reference numerals. There are also cases where small components and the like are not hatched in cross-sectional views for clarity of illustration.

Embodiment 1

[0060] FIG. **1** is a cross-sectional view showing a structure of a semiconductor image sensing element **10** according to the first embodiment of the present invention. The semiconductor image sensing element **10** according to the present embodiment comprises: a semiconductor element **11** including an image sensing area **13**, a peripheral circuit region **14**, a plurality of electrode portions **15** provided in the peripheral circuit region **14**, and a plurality of micro-lenses **16** provided on the image sensing area **13**; and an optical member having a configuration covering at least the image sensing area **13** and bonded over the micro-lenses **16** via a transparent bonding member **20**. The side surface region of the optical member **18** is formed with a light shielding film **19** serving as a light shielding portion for preventing the irradiation of the image sensing area **13** with a reflected light beam or a scattered light beam from the side surface region.

[0061] A more specific structure will be described herein below. In the semiconductor element **11**, the image sensing area **13** is formed in a semiconductor substrate **12** made of silicon, germanium, a group III-V compound, or the like and the peripheral circuit region **14** is formed around the outer periphery of the image sensing area **13**. In the peripheral circuit region **14**, the electrode portions **15** are provided. On the surface of the image sensing area **13**, the micro-lenses **16** made of a transparent acrylic resin or the like are formed.

[0062] Over the upper surfaces of the micro-lenses **16**, the optical member **18** is bonded via the transparent bonding member **20**. On the side surface region of the optical member **18**, the light shielding film **19** having a light shielding property is formed by using a meal or a resin. The optical member **18** having the light shielding film **19** formed only on the side surface region thereof can be produced by, e.g., forming a resist film on each of the both surfaces of the optical member **18**, forming a metal film by vapor deposition or the like, and then removing the resist film.

[0063] The optical member **18** can be produced by forming a material such as, e.g., Terex glass, Pyrex glass, quartz, an acrylic resin, a polyimide resin, or an epoxy resin into a sheet-like configuration. For the transparent bonding member **20**, a UV setting or thermosetting material having a refractivity lower than that of the material of the micro-lenses **16**, such as an acrylic resin, a polyimide resin, or an epoxy resin, can be used.

[0064] By forming such a structure, the side surface region of the optical member **18** is covered with the light shielding film **19** having a light shielding property. As a result, even when the semiconductor image sensing element **10** is mounted on a mounting substrate, a reflected light beam or a scattered light beam from metal thin wires or the like can be prevented from being incident on the image sensing area **13**. In addition, even when the side surface region of the optical member **18** is irradiated with the light incident on the main surface of the optical member **18**, the reflected light beam therefrom can be prevented from being incident again on the image sensing area **13**. This allows the prevention of the disturbed light beam from being incident on pixels in the image sensing area **13** and thereby allows the prevention of the occurrence of flare, smear, or the like in image signals.

[0065] Since the optical member **18** is bonded directly over the micro-lenses **16** formed on the image sensing area **13** of the semiconductor element **11** via the transparent bonding member **20**, the thin and compact semiconductor image sensing element **10** can be obtained.

[0066] A description will be given herein below to a method for fabricating the semiconductor image sensing element **10** according to the present embodiment.

[0067] FIGS. **2**A to **2**C are views illustrating the semiconductor elements **11** according to the present embodiment that have been formed on a semiconductor wafer **24** and showing the configuration of each of the separate individual semiconductor elements **11**, of which FIG. **2**A is a plan view showing the semiconductor elements **11** that have been formed on the semiconductor wafer **24**, FIG. **2**B is a plan view of each of the separate individual semiconductor elements **11**, and FIG. **2**C is a cross-sectional view along the line A-A of FIG. **2**B.

[0068] As shown in FIG. **2**A, the semiconductor elements **11** are formed with a given arrangement pitch on the principal surface of the semiconductor wafer **24** in such a manner that they are separated by individual dicing lanes (not shown) for finally dividing the semiconductor wafer **24** into the individual semiconductor image sensing elements **10**. As shown in FIGS. **2**B and **2**C, each of the semiconductor elements **11** is comprised of the image sensing area **13** located at the center portion thereof, the peripheral circuit region **14** provided around the image sensing area **13**, the electrode portions **15** provided in the peripheral circuit region **14**, and the micro-lenses **16** provided as an array on